PSYCHOLOGY 480: GENES AND COGNITION
WEDNESDAY 2:00 – 4:30
SEWALL HALL 462

INSTRUCTOR CONTACT INFORMATION

1. Instructor: James L. Dannemiller
2. Office: Sewall Hall 470A
3. Email: dannemil@rice.edu
4. Office Hours: T 1:00 – 2:00; Th 1:00 – 2:00

COURSE OBJECTIVES AND LEARNING OUTCOMES

5. The student will understand behavior genetic and molecular genetic methods in modern genetic association studies.
6. The student will be familiar with the common terminology encountered in modern genetic association studies.
7. The student will be able to access, read and understand genetic studies relevant to a topic of interest in Psychology.

REQUIRED TEXTS AND MATERIALS

Plomin, R., DeFries, J. C., Knopik, V. S., and Neiderhiser, J. M. (2013). Behavioral genetics, 6TH edition. New York: Worth Publishers.

Please bring a laptop, tablet, or something other than a smartphone to access the internet to class each week. You will need this to look up terminology in the course.

EXAMS AND PAPERS

1. Twice during the semester you will lead a class discussion on an assigned article. In addition to leading the discussion on the article, you will submit two questions on the article that will be given to all of the students in the class after the article is discussed. Those two questions should be substantive ones (not something like "How many subjects were there in this study?") and submitted BEFORE class to psyc480@gmail.com Notice, this is a gmail address, not a Rice email address. Along with the questions, you should submit the answer to each question. You will automatically be given full credit on these questions (see the next point) that you submit.

2. Students will answer those questions some time between the end of that class and the beginning of the next class period. Students will submit their answers to those questions by uploading a file to Owlspace dropbox. The filename will consist of your last name and the date that the article was discussed. For example, if your name is Maria Greenwald, and you are answering questions on an article that was discussed on September 30, then the filename would be greenwald september 30.docx or greenwald_september_30.docx. You may not discuss the questions or your answers with any other human being.

3. Each student will submit a 10 – 12 page paper at the end of the term summarizing literature relevant to a topic of interest to them. For example, you might be interested in genetic contributions to some disorder such as Fragile X syndrome or ADHD. You would then find genetic association or behavior genetic studies relevant to that topic and summarize their results in your paper.

GRADE POLICIES

40%: Your grades from your answers to the article questions each week will be added (averaged), and this will contribute a total of 40% to your course grade. I will throw out your lowest grade before computing your overall article-answers grade. If there were a total of ten quizzes throughout the semester (after throwing out your lowest quiz grade), then each quiz would count 4% toward your grade.

30%: Your grade from the final paper will contribute approximately 30% toward your course grade.

20%: Twice during the semester you will lead a discussion on one of the assigned articles. Each of these will be worth 10% of your course grade.

10% The remaining 50% of your course grade will come from your participation in class discussion. Asking questions is a good way to participate in class. Offering answers is also another good way to participate.

Absence Policies

You are expected to attend every class unless there is an emergency, death in the immediate family (grandparents, parents, siblings), or a religious obligation. Please email me BEFORE CLASS if you are going to be absent from class, and include the reason for your absence.

If you are absent for an excused reason, then I will allow you to make up the quiz that you missed. If you are absent without an excused reason, then a 0 will be recorded for that quiz, and you will not be able to make it up. That quiz grade would count as the one the gets thrown out in computing your final quiz grade.

Rice Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Disability Support Services

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Syllabus Change Policy

This syllabus is only a guide for the course and is subject to change with advanced notice.

Please note: On the following dates, class will be dismissed at 3:55 instead of 4:30.
September 16, October 21, November 18

Class in canceled on September 23 for religious observance reasons and on October 7 because I will be at the Annual Conference of the American Society for Human Genetics.

Course Schedule

Week 1	Introduction	Text
8/26	**"The Ghost of Bobby Dunbar"**	Text Reading (Ch.)
Week 2	**General; Where We Came From**	2, 3
9/2		
Week 3	**Personal Genetics**	4, 6, 9
9/9		
Week 4	**Ethnicity, Genetics and Disease**	7
9/16	**Class dismissed at 3:55 pm**	

Week 5	**NO CLASS**	
9/23	**Religious observance**	
Week 6	**Heritability and Genetics of Intelligence**	12, 13
9/30		
Week 7	**NO CLASS**	
10/7		
Week 8	**Genetics of Childhood Neurological Disorders**	11, 16
10/14		
Week 9	**Genetics of Attention, Attention Disorders, and Brain Asymmetry**	
10/21	**Class dismissed at 3:55 pm**	
Week 10	**Genetics of Language Disorders**	
10/28		
Week 11	**Heritability and Genetics of Sexual**	**8**

	Orientation and Sex Differences	
11/4		
Week 12	**Heritability and Genetics of Personality**	**14, 17**
11/11		
Week 13	**Epigenetics**	**10**
11/18	**Class dismissed at 3:55 pm**	
Week 14	**Propensity to Violence and Suicide**	
11/25		
Week 15	**Genetic Counseling**	**19**
12/2		

TOPICS (13 CLASS PERIODS EXCLUDING CLASS 1 AND YOM KIPPUR)
THE COMPLETE REFERENCE FOR EACH OF THESE READINGS IS GIVEN IN THE REFERENCE LIST BELOW.

General; Where we came from

(Lehner, 2013)
(Prufer et al., 2014)
(Semino, 2000)

Personal Genetics

(Nyholt, Yu, & Visscher, 2009)
(Dewey et al., 2014)
(Annas, 2014)
(Shriver, 2004)

Ethnicity, Genetics and Disease

(Faerman, 2001)
(McDowell, Mules, Fabacher, Shapira, & Blitzer, 1992)

Heritability and Genetics of Intelligence

(Burdick et al., 2006)
(Davies et al., 2011)

Genetics of Childhood Neurological disorders

(Morrow et al., 2008)
(Clayton-Smith, 2003)

Genetics of Attention, Attention Disorders and Brain Asymmetry

(Jahanshad et al., 2010)
(Elia et al., 2010)

Genetics of Language Disorders

(Vernes et al., 2008)
(Enard et al., 2002)

Heritability and Genetics of Sexual Orientation and Sex Differences

(Ngun, Ghahramani, Sánchez, Bocklandt, & Vilain, 2011)
(Pillard & Michael Bailey, 1998)

Heritability and Genetics of Personality

(Terracciano et al., 2010)
(Mier, Kirsch, & Meyer-Lindenberg, 2010)

Epigenetics

(Dias & Ressler, 2014)
(Yehuda et al., 2015)

Propensity to violence and Suicide

(Brent & Mann, 2005)
(Caspi et al., 2002)
(Ferguson & Beaver, 2009)

Genetic Counseling

(Hodgkinson, Murphy, O'Neill, Brzustowicz, & Bassett, 2001)
(Biesecker, 2001)
(Mueller, 2006)

Reference list

Copies of these references are on Owlspace under Location: PSYC 480 001 F15 Resources / Articles

Annas, G. J.; Elias, S. (2014). 23andMe and the FDA. *New England Journal of Medicine, 370,* 985-988.

Biesecker, B. B. (2001). Goals of genetic counseling. *Clinical Genetics, 60,* 323-330.

Brent, David A., & Mann, J. John. (2005). Family genetic studies, suicide, and suicidal behavior. *American Journal of Medical Genetics Part C: Seminars in Medical Genetics, 133C(1),* 13-24. doi: 10.1002/ajmg.c.30042

Burdick, K. E., Lencz, T., Funke, B., Finn, C. T., Szeszko, P. R., Kane, J. M., . . . Malhotra, A. K. (2006). Genetic variation in DTNBP1 influences general cognitive ability. *Hum Mol Genet, 15(10),* 1563-1568. doi: 10.1093/hmg/ddi481

Caspi, Avshalom, McClay, Joseph, Moffitt, Terrie E., Mill, Jonathan, Martin, Judy, Craig, Ian W., . . . Poulton, Richie. (2002). Role of Genotype in the Cycle of Violence in Maltreated Children. *Science, 297(5582),* 851-854. doi: 10.1126/science.1072290

Clayton-Smith, J.; Laan, L. (2003). Angelman syndrome: a review of the clinical and genetic aspects. *Journal of Medical Genetics, 40,* 87–95.

Davies, G., Tenesa, A., Payton, A., Yang, J., Harris, S. E., Liewald, D., . . . Deary, I. J. (2011). Genome-wide association studies establish that human intelligence is highly heritable and polygenic. *Mol Psychiatry, 16(10),* 996-1005. doi: 10.1038/mp.2011.85

Dewey, F. E., Grove, M. E., Pan, C., Goldstein, B. A., Bernstein, J. A., Chaib, H., . . . Quertermous, T. (2014). Clinical interpretation and implications of whole-genome sequencing. *JAMA, 311(10),* 1035-1045. doi: 10.1001/jama.2014.1717

Dias, B. G., & Ressler, K. J. (2014). Parental olfactory experience influences behavior and neural structure in subsequent generations. *Nat Neurosci, 17(1),* 89-96. doi: 10.1038/nn.3594

Elia, J., Gai, X., Xie, H. M., Perin, J. C., Geiger, E., Glessner, J. T., . . . White, P. S. (2010). Rare structural variants found in attention-deficit hyperactivity disorder are preferentially associated with neurodevelopmental genes. *Mol Psychiatry, 15(6),* 637-646. doi: 10.1038/mp.2009.57

Enard, W., Khaitovich, P., Klose, J., Zollner, S., Heissig, F., Giavalisco, P., . . . Paabo, S. (2002). Intra- and interspecific variation in primate gene expression patterns. *Science, 296(5566),* 340-343. doi: 10.1126/science.1068996

Faerman, Marina. (2001). Population Genetics of the Ashkenazim *eLS:* John Wiley & Sons, Ltd.

Ferguson, Christopher J., & Beaver, Kevin M. (2009). Natural born killers: The genetic origins of extreme violence. *Aggression and Violent Behavior, 14(5),* 286-294. doi: http://dx.doi.org/10.1016/j.avb.2009.03.005

Hodgkinson, Kathleen A., Murphy, Jillian, O'Neill, Sheri, Brzustowicz, Linda, & Bassett, Anne S. (2001). Genetic Counselling for Schizophrenia in the Era of Molecular Genetics. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie, 46(2),* 123-130.

Jahanshad, Neda, Lee, Agatha D., Barysheva, Marina, McMahon, Katie L., de Zubicaray, Greig I., Martin, Nicholas G., . . . Thompson, Paul M. (2010). Genetic influences on brain asymmetry: A DTI study of 374 twins and siblings. *NeuroImage, 52(2),* 455-469. doi: http://dx.doi.org/10.1016/j.neuroimage.2010.04.236

Lehner, B. (2013). Genotype to phenotype: lessons from model organisms for human genetics. *Nat Rev Genet, 14(3),* 168-178. doi: 10.1038/nrg3404

McDowell, G. A., Mules, E. H., Fabacher, P., Shapira, E., & Blitzer, M. G. (1992). The presence of two different infantile Tay-Sachs disease mutations in a Cajun population. *American Journal of Human Genetics, 51(5),* 1071-1077.

Mier, D., Kirsch, P., & Meyer-Lindenberg, A. (2010). Neural substrates of pleiotropic action of genetic variation in COMT: a meta-analysis. *Mol Psychiatry, 15(9),* 918-927. doi: 10.1038/mp.2009.36

Morrow, Eric M., Yoo, Seung-Yun, Flavell, Steven W., Kim, Tae-Kyung, Lin, Yingxi, Hill, Robert Sean, . . . Walsh, Christopher A. (2008). Identifying Autism Loci and Genes by Tracing Recent Shared Ancestry. *Science, 321(5886)*, 218-223. doi: 10.1126/science.1157657

Mueller, R. F. (2006). Genetic Counseling: Consanguinity. In D. N. Cooper (Ed.), *Encyclopedia of Life Sciences. Online:* John Wiley & Sons, Ltd.

Ngun, Tuck C., Ghahramani, Negar, Sánchez, Francisco J., Bocklandt, Sven, & Vilain, Eric. (2011). The genetics of sex differences in brain and behavior. *Frontiers in Neuroendocrinology, 32(2),* 227-246. doi: http://dx.doi.org/10.1016/j.yfrne.2010.10.001

Nyholt, D. R., Yu, C. E., & Visscher, P. M. (2009). On Jim Watson's APOE status: genetic information is hard to hide. *Eur J Hum Genet, 17(2)*, 147-149. doi: 10.1038/ejhg.2008.198

Pillard, R. C., & Michael Bailey, J. (1998). Human sexual orientation has a heritable component. *Human Biology, 70(2)*, 347-365.

Prufer, K., Racimo, F., Patterson, N., Jay, F., Sankararaman, S., Sawyer, S., . . . Paabo, S. (2014). The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature, 505(7481),* 43-49. doi: 10.1038/nature12886

Semino, O. (2000). The Genetic Legacy of Paleolithic Homo sapiens sapiens in Extant Europeans: A Y Chromosome Perspective. *Science, 290(5494),* 1155-1159. doi: 10.1126/science.290.5494.1155

Shriver, Mark D.;Kittles, Rick A. (2004). Genetic ancestry and the search for personalized genetic histories. *Nature Reviews: Genetics, 5,* 611-618. doi: http://dx.doi.org/10.1038/nrg1405

Terracciano, A., Sanna, S., Uda, M., Deiana, B., Usala, G., Busonero, F., . . . Costa, P. T., Jr. (2010). Genome-wide association scan for five major dimensions of personality. *Mol Psychiatry, 15(6),* 647-656. doi: 10.1038/mp.2008.113

Vernes, Sonja C., Newbury, Dianne F., Abrahams, Brett S., Winchester, Laura, Nicod, Jérôme, Groszer, Matthias, . . . Fisher, Simon E. (2008). A Functional Genetic

Link between Distinct Developmental Language Disorders. *New England Journal of Medicine, 359(22),* 2337-2345. doi: doi:10.1056/NEJMoa0802828

Yehuda, Rachel, Daskalakis, Nikolaos P., Bierer, Linda M., Bader, Heather N., Klengel, Torsten, Holsboer, Florian, & Binder, Elisabeth B. (2015). Holocaust exposure induced intergenerational effects on FKBP5 methylation. *Biological Psychiatry*. doi: 10.1016/j.biopsych.2015.08.005